

General

Title

Failure to rescue: percentage of patients who died with a complication in the hospital.

Source(s)

Failure to rescue in-hospital mortality measure specifications. Philadelphia (PA): The Children's Hospital of Philadelphia Research Institute; 2015 Aug. 56 p. [33 references]

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Outcome

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of patients who died with a complication in the hospital.

Rationale

Evidence to date suggests that complication measures are less sensitive to hospital characteristics, after adjusting for severity of illness, than mortality based measures. This is an underlying assumption of failure to rescue (FTR) theory—complications are undesirable outcome measures because they reflect underlying patient severity and diagnosis coding more than they reflect hospital care. Instead, a hospital's quality is put to the test when a patient develops a complication, and whether a patient is salvaged after a complication will be a function of the care delivered by the hospital and its knowledge base, depth, and facilities. Thus, "good" hospitals will rescue patients by identifying complications quickly and treating them aggressively, resulting in lower FTR. Although many "failures," just like deaths, are often not preventable, we have argued that FTR may be a better measure for comparing hospital quality because of better severity adjustment properties, and because of its focus on hospital actions. By

studying a population of patients who, by definition, have already developed a complication, the specifics of severity of illness adjustment becomes less important in failure rate analyses, because all patients have experienced complications and thus are more uniformly ill.

Evidence for Rationale

Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in hospital mortality associated with inpatient surgery. N Engl J Med. 2009 Oct 1;361(14):1368-75. [PubMed](#)

Hartz AJ, Krakauer H, Kuhn EM, Young M, Jacobsen SJ, Gay G, Muenz L, Katzoff M, Bailey RC, Rimm AA. Hospital characteristics and mortality rates. N Engl J Med. 1989 Dec 21;321(25):1720-5. [PubMed](#)

Sheetz KH, Waits SA, Krell RW, Campbell DA, Englesbe MJ, Ghaferi AA. Improving mortality following emergent surgery in older patients requires focus on complication rescue. Ann Surg. 2013 Oct;258(4):614-7; discussion 617-8. [PubMed](#)

Silber JH, Rosenbaum PR. A spurious correlation between hospital mortality and complication rates: the importance of severity adjustment. Med Care. 1997 Oct;35(10 Suppl):OS77-92. [PubMed](#)

Primary Health Components

In-hospital mortality; general, orthopedic or vascular surgery; complications

Denominator Description

General surgery, orthopedic and vascular patients with complications plus patients who died in the hospital without complications (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital. See the related "Numerator Inclusions/Exclusions" field.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Unspecified

Extent of Measure Testing

Split half sample reliability had a correlation of 0.39, similar to in-hospital mortality (0.36).

Marginal and partial coefficients in logit models using detailed patient characteristics and hospital characteristics shown to be associated with better outcomes in previous studies (Silber et al., 2007; Aiken et al., 2002). The marginal results use one hospital characteristic at a time along with all patient characteristics. "Partial" regression results, using all hospital and patient variables simultaneously have the disadvantage that correlation between hospital characteristics can cause difficulty in interpreting the effects of individual hospital variables. The following hospital characteristics have been shown to be associated with better outcomes: (1) teaching hospital status (member of the American Council of Teaching Hospitals); (2) high technology status (does the hospital perform open heart surgery or perform organ transplantation); (3) hospital size greater than 200/250 beds; (4) bed-to-nurse ratio (where nurses are the sum of registered nurse [RN] plus licensed practical nurse [LPN] full-time equivalent [FTE] positions); and (5) nursing skill mix (the ratio of RN/[RN+LPN]) (Silber et al., 2007; Silber et al., 1995; Silber et al., 1997; Silber et al., 2000; Silber et al., 2002; Aiken et al., 2002; Aiken et al., 2003).

The relative contribution of patient-to-hospital characteristics that predicted each outcome of interest, as provided by the omega statistic (Silber et al., 2007; Silber, Rosenbaum, & Ross, 1995). The omega statistic computes a ratio of the squared sum of the log odds for model patient variables divided by a similar quantity calculated for the model hospital variables. All else being equal, outcome measures that have lower omega ratios may be more desirable quality indicators, since the lower the omega, the greater the hospital's impact on outcome relative to the patient's impact. This is especially important if modeling patient severity is difficult (as with claims data) so that the lower the omega suggests the higher relative influence of hospital characteristics as compared to patient characteristics.

Evidence for Extent of Measure Testing

Aiken LH, Clarke SP, Cheung RB, Sloane DM, Silber JH. Educational levels of hospital nurses and surgical patient mortality. JAMA. 2003 Sep 24;290(12):1617-23. [PubMed](#)

Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002 Oct 23-30;288(16):1987-93. [PubMed](#)

Silber J, Rosenbaum P, Ross R. Comparing the contributions of groups of predictors: which outcomes vary with hospital rather than patient characteristics?. J Am Stat Assoc. 1995;90:7-18.

Silber JH, Kennedy SK, Even-Shoshan O, Chen W, Koziol LF, Showan AM, Longnecker DE. Anesthesiologist direction and patient outcomes. Anesthesiology. 2000 Jul;93(1):152-63. [PubMed](#)

Silber JH, Kennedy SK, Even-Shoshan O, Chen W, Mosher RE, Showan AM, Longnecker DE. Anesthesiologist board certification and patient outcomes. Anesthesiology. 2002 May;96(5):1044-52. [PubMed](#)

Silber JH, Romano PS, Rosen AK, Wang Y, Even-Shoshan O, Volpp KG. Failure-to-rescue: comparing definitions to measure quality of care. Med Care. 2007 Oct;45(10):918-25. [PubMed](#)

Silber JH, Rosenbaum PR, Schwartz JS, Ross RN, Williams SV. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995 Jul 26;274(4):317-23. [PubMed](#)

Silber JH, Rosenbaum PR, Williams SV, Ross RN, Schwartz JS. The relationship between choice of outcome measure and hospital rank in general surgical procedures: implications for quality assessment. Int J Qual Health Care. 1997 Jun;9(3):193-200. [PubMed](#)

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age 18 to 90 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

Typically, at least one year of data has been searched to identify cases.

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

General surgery, orthopedic and vascular patients with complications plus patients who died in the hospital without complications

Include adult patients admitted for one of the procedures in the general surgery, orthopedic or vascular diagnosis-related groups (DRGs). Refer to Appendix A in the original measure documentation for additional information.

Exclusions

Patients over age 90, under age 18

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital.

Failure to rescue (FTR) is defined as the probability of death following a complication. All patients in an FTR analysis have developed a complication or died without a documented complication (by definition). Refer to the original measure documentation for additional information.

Note:

Complicated patient has at least one of the complications defined in Appendix B of the original measure documentation. Complications are defined using the secondary International Classification of Diseases, Ninth Revision (ICD-9) diagnosis and procedure codes and the diagnosis-related group (DRG) code of the current admission. International Classification of Diseases, Tenth Revision (ICD-10) codes are provided in Appendix D of the original measure documentation. Comorbidities are defined in Appendix C of the original measure documentation using secondary ICD-9 diagnosis codes of the current admission and primary or secondary ICD-9 diagnosis codes of previous admissions or encounters within 90 days of the admission date of the current admission. ICD-10 codes are provided in Appendix E of the original measure documentation. When Current Procedural Terminology (CPT) codes are available, the definition of complications and comorbidities are augmented to include them.

Exclusions

Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Paper medical record

State/Province public health data

Type of Health State

Death

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Measure Specifics Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk Adjustment: Model was developed using logistic regression analysis.

Associated Data Elements: Age in years, sex, race, comorbidities, diagnosis-related groups (DRGs) (combined with and without complications) and procedure codes within DRGs, transfer status.

Failure to rescue (FTR) is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a documented complication.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Failure to rescue in-hospital mortality.

Measure Collection Name

Failure to Rescue Measures

Submitter

The Children's Hospital of Philadelphia - Hospital/Medical Center

Developer

The Children's Hospital of Philadelphia - Hospital/Medical Center

Funding Source(s)

The Children's Hospital of Philadelphia

Composition of the Group that Developed the Measure

- Jeffrey H. Silber, MD, PhD
- The Children's Hospital of Philadelphia
- The University of Pennsylvania

Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2015 Dec 10

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Aug

Measure Maintenance

Annual

Date of Next Anticipated Revision

2017 Aug 30

Measure Status

This is the current release of the measure.

This measure updates a previous version: Failure to rescue in-hospital mortality measure specifications. Philadelphia (PA): The Children's Hospital of Philadelphia Research Institute; 2015 May. 24 p.

Measure Availability

Source available from [The Children's Hospital of Philadelphia \(CHOP\) Research Institute Web site](#)

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NQMC Status

This NQMC summary was completed by ECRI Institute on April 1, 2014. The information was verified by the measure developer on April 9, 2014.

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Production

Source(s)

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